

FY2011 GIS Database Development Proposal
for
LIDAR Partnership

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Summary

This project will acquire high-resolution elevation data derived from Light Detection and Ranging (LIDAR) technology over 5,413 square miles covering all of Dickinson (843 sq mi), Jewell (905), Lyon (846 sq mi) and Mitchell (711 sq mi) counties and portions of Chase (562 sq mi), Greenwood (132 sq mi), Harvey (256 sq mi), Morris (278 sq mi) and Reno (880 sq mi) counties. The work will be done through a State contract mechanism for professional photogrammetric services. The product specifications will be defined as 1.4 meter ground sample distance (GSD) with 15-18.5 vertical accuracy, and 0.6 meter horizontal accuracy. Product deliverables will include the raw classified LIDAR data of all point returns and hydro flattened bare earth digital elevation model. The data will also support the generation of 2 ft contours to FEMA specifications.

This proposal requests that the GIS Policy Board provide state matching funds of \$175,000 toward the project, which will contribute toward completing portions of nine counties in Kansas and allow for increased federal contributions.

Background/Justification

As part of the Cooperating Technical Partnership with FEMA, Kansas Dept. of Agriculture-Division of Water Resources manages the development of new or updated county-wide Flood Insurance Rate Maps (FIRM) for various counties in Kansas. Map accuracy is very important to the National Flood Insurance Program and is reliant on an accurate topographic source based on LIDAR technology. FEMA would like to leverage their funding in LIDAR partnerships within the State, rather than pay 100% of the cost of acquisition. The data can also be used in the development of dam breach inundation maps for high and significant hazard dams throughout the area.

LiDAR data are also essential for application of a Wetland Assessment Method under development by the Kansas Water Office. The method will be applied to watersheds above federal reservoirs, in priority of their importance for public water supply needs and their current rate of sedimentation, to support the reservoir sustainability initiative.

The Kansas Water Office will use the LIDAR data to improve our knowledge and understanding in five key areas as we research, plan and develop reservoir sustainability strategies.

1. Flood pool surveys of our federal reservoirs are necessary to assess pool reallocation options as we address water supply and demand issues in the state.
2. LIDAR surveys of areas for potential future reservoir development/off-stream storage locations would aid in determining potential supply volumes available in those areas.

3. Depressional areas identified in LiDAR surveys will be combined with other data layers identified in the Wetland Assessment Method to target wetlands for protection and restoration above John Redmond, Lovewell, Waconda and Cheney Reservoirs.
4. 3D surfaces of watersheds above these federal reservoirs would improve land surface models for sediment delivery assessments.
5. Those 3D surfaces would also record the current state of the physical condition of the main stem and tributaries draining into federal reservoirs. Subsequent LIDAR surveys of the same areas could be used to volumetrically determine sediment flux from stream bank sources in the watershed and identify stable and unstable sub-watersheds. This information could direct policies and programs to unstable systems and help assess the effectiveness of policies and programs already implemented in subwatersheds.

NRCS-KS will use this data to do breach route analysis on dams as well as soil survey update and watershed planning activities. NRCS can also use the Wetland Assessment Method to target Wetland Reserve Program projects for the highest benefit.

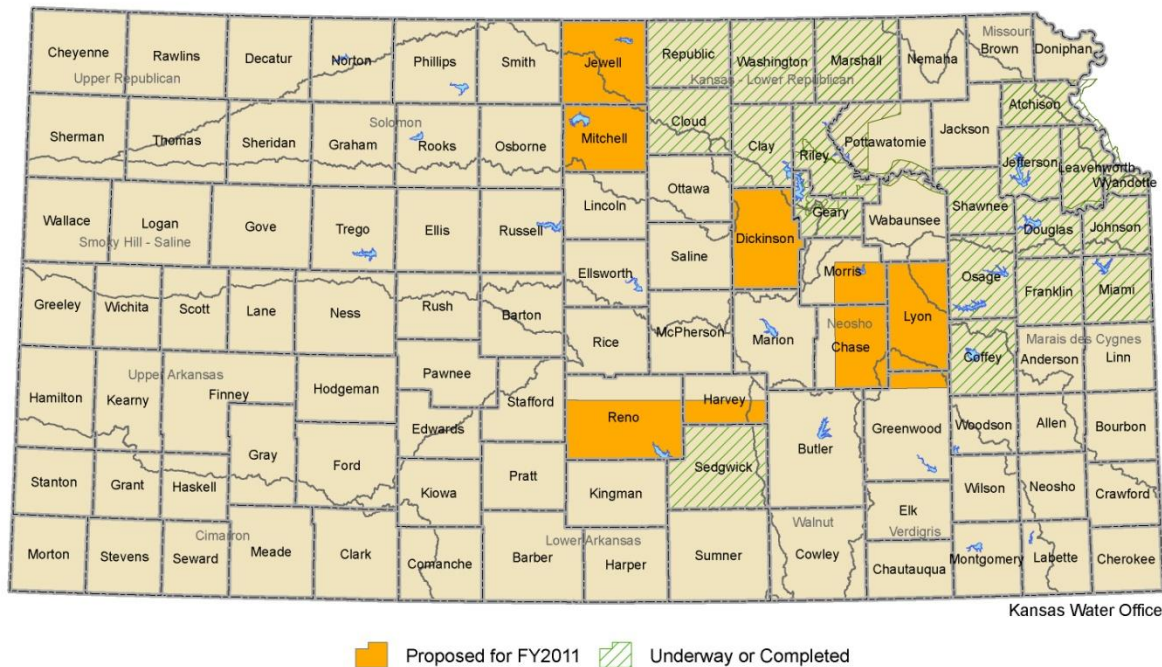
USGS will use the improved elevation data to support the development of updated contours for the US Topo maps. The LIDAR project will also be used in various water science projects.

The Kansas GIS Policy Board has completed a business plan on Improved Statewide Elevation Data, which states a programmatic goal to develop improved statewide elevation data. This project would be a continuation of LIDAR project to support this goal.

Project Description

The proposed project areas for LIDAR acquisition are all or portions of the 9 counties of Chase, Dickinson, Greenwood, Harvey, Jewell, Lyon, Mitchell, Morris and Reno. The areas encompass portions of the Kansas-Lower Republican, Solomon, Neosho, Lower Arkansas, and Smoky Hill-Saline River basins, totaling 5,413 square miles. The watersheds above 4 federal reservoirs are included in the project area: John Redmond (Lyon, Morris and Chase Counties), Lovewell (Jewell County), Waconda (Mitchell County), and Cheney (Reno County).

Proposed LiDAR Development FY 2011



Specifications:

Area 5,413 square miles (all or portions of Chase, Dickinson, Harvey, Jewell, Lyon, Marion, Mitchell, Morris and Reno Counties)

Resolution of Lidar = 1.4 meter GSD (1.0 ppsm)

Vertical Accuracy of bare earth 18.5 cm RMSE @ 95% confidence, 15 cm RMSE @ 90% confidence;

Vertical in Vegetation 37 cm RMSE @ 95% confidence

Horizontal Accuracy 0.6 meter RMSE @ 95% confidence

Projection UTM Zone 14

Elevation values in meters with 1 centimeter resolution in the NAVD88 datum

Tiling 5,000 m x 5,000 m

Tile-based FGDC Metadata for all products

Product Deliverables:

All Points LiDAR Data (post calibrated, pre-filtered)

- Classified raw data in LAS (LAS version 1.3) File format Exchange format
 - LAS classes will include:

1	Unclassified (above ground)
2	Ground (bare earth surface)
7	Low Point and noise
9	Water

Bare-Earth Digital Elevation Model (raster-based DEM derived from bare-earth points of the filtered bare-earth data)

- Horizontal DEM grid spacing of 1 meter or 2 meter
- Hydro Flattening on water bodies > 3/4 acre and streams > 50 ft wide

- ERDAS .IMG format
- Will support the development of 2 ft contours

LIDAR would be flown in December 2010 - March 2011. Products would be delivered approximately 4 months after acquisition.

Project Management and QC - A professional services firm will be used to provide project management and conduct the quality control on the data based on acceptance criteria developed for the project.

Experience/Commitment:

The Kansas Partners include:

Kansas Department of Agriculture
 Natural Resources Conservation Service
 U.S. Geological Survey
 U.S. Environmental Protection Agency
 Kansas GIS Policy Board

Funding efforts are underway for additional partners, including:

Cheney Lake Watershed Reno County
 City of Hutchinson Harvey County

Budget:

Kansas's Budget is based on the following contributions:

KDA (FEMA funding)	\$400,000
NRCS	\$40,000
USGS	\$228,750
EPA	\$300,000
Kansas GIS Policy Board	<u>\$175,000</u>
Total	\$1,143,750

Project Costs for Kansas:

Project Management and QC (\$20/sq mi)	\$103,977
Data Acquisition & DEMs (\$200/sq mi)	\$1,039,773

Preliminary estimates indicate the 9-county area will cost approximately \$1,143,750. The partnership request for the Kansas GIS Policy Board is \$175,000. The project area is subject to modification; final determination will be made as the partner agencies commit funds.